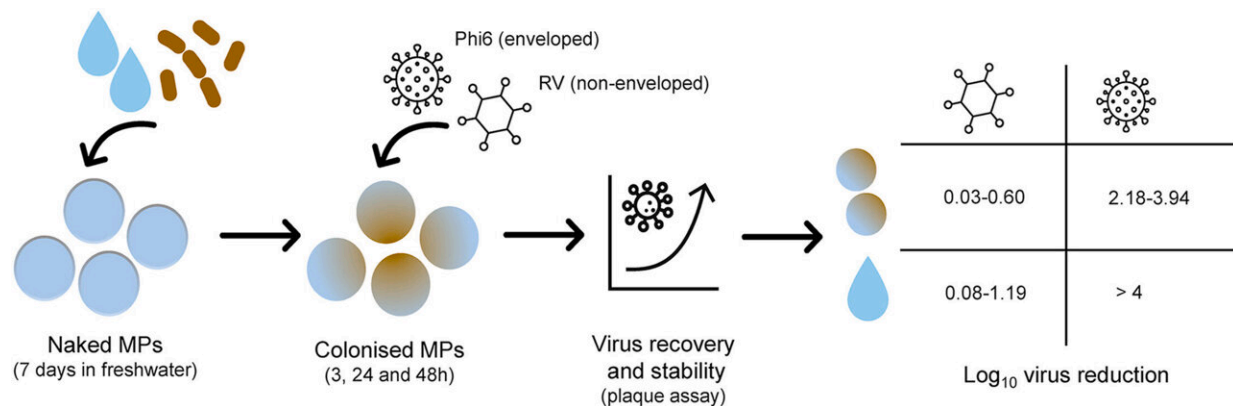


Hitchhiking viruses can survive on microplastics in freshwater

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Graphical abstract. Credit: *Environmental Pollution* (2022). DOI: 10.1016/j.envpol.2022.119594

Scientists have proven for the first time that viruses can survive and remain infectious by binding themselves to plastics in freshwater—raising concerns about the potential impact on human health.

Rotavirus, which causes diarrhea and an upset stomach, was found to survive for up to three days in [lake water](#) by attaching itself to the surfaces of tiny beads of plastic pollution, called microplastics.

The study, led by the University of Stirling, is the first of its kind to

explore the issue using water taken from the natural environment—with previous research focusing only on the spread of such viruses in sterile hospital settings.

The new findings form part of the wider Plastic Vectors project, which is investigating how [plastics](#) in the environment can help transport bacteria and viruses, and the impact that may have on human health.

Professor Richard Quilliam, lead researcher on the project at the University of Stirling, said: "We found that viruses can attach to microplastics, which allows them to survive in the water for three days, possibly longer.

"Even if a [wastewater treatment plant](#) is doing everything it can to clean sewage waste, the water discharged still has microplastics in it, which are then transported down the river, into the estuary and end up on the beach. We weren't sure how well viruses could survive by 'hitch-hiking' on plastic in the environment, but they do survive, and they do remain infectious.

"Microplastics are so small that they could potentially be ingested by someone swimming, and sometimes they wash up on the beach as lentil-sized, brightly colored pellets called nurdles that children might pick up and put in their mouths. It doesn't take many [virus particles](#) to make you sick.

"And if the viruses then release themselves from the plastic into the water or the sand, their persistence in the environment is increased."

The researchers tested two types of viruses—those with an envelope, or "lipid coat" around them, such as the flu virus (they tested bacteriophage Phi6), and those without: enteric viruses, such as [rotavirus](#) and norovirus (they tested rotavirus strain SA11). They found that in those with an

envelope, the envelope quickly dissolved, and the virus was deactivated, whereas those without an envelope successfully bound to the microplastics and survived.

"Viruses can also bind to natural surfaces in the environment," said Professor Quilliam. "However, plastic pollution lasts a lot longer than those materials.

"This research is very much a proof-of-concept for conducting more research into how long pathogens can survive by binding to microplastics, as we only tested for three days, and what happens to them next."

The paper, "Binding, recovery, and infectiousness of enveloped and non-enveloped [viruses](#) associated with plastic pollution in [surface water](#)," is published in the journal *Environmental Pollution*.

More information: Vanessa Moresco et al, Binding, recovery, and infectiousness of enveloped and non-enveloped viruses associated with plastic pollution in surface water, *Environmental Pollution* (2022). [DOI: 10.1016/j.envpol.2022.119594](#)

Provided by University of Stirling

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